1.0

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM

FINAL RECORD OF DECISION

UMATILLA DEPOT ACTIVITY MISCELLANEOUS SITES OPERABLE UNIT

June 30, 1994

Signed 9-30-94.

In accordance with Army Regulation 200-2, this document is intended by the Army to comply with the National Environmental Policy Act of 1969 (NEPA).

Table of Contents

List of Figures and Tables

Figures — Page

Tables — Page

Acronyms and Abbreviations

ARAR	Applicable or relevant and appropriate requirement
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
cy	Cubic yards
DDD	Dichloro diphenyl dichloroethane (DDT degradation product)
DDE	Dichloro diphenyl ethane (DDT degradation product)
DDT	Dichloro diphenyl trichloroethane (pesticide)
DRMO	Defense Reutilization Marketing Office
DoD	Department of Defense
EA	Ecological Assessment
EPA	U.S. Environmental Protection Agency
EPIC	Environmental Photographic Interpretation Center
FFA	Federal Facility Agreement
FR	Federal Register
HEAST	Health Effects Assessment Summary Tables
HI	Hazard Index
HMX	High Melting Explosive (octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine)
HQ	Hazard Quotient
IRIS	Integrated Risk Information System
LDR	Land Disposal Restrictions
MCL	Maximum contaminant level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NOAELs	No Observed Adverse Effect Levels
NPL	National Priorities List

NSA	No standard available
O&M	Operations and maintenance
ODEQ	Oregon Department of Environmental Quality
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
ppm	Parts per million by weight (equivalent to µg/g and mg/kg)
RAB	Restoration Advisory Board
RAC	Remedial Action Criteria
RAG	Remedial Action Goals
RCRA	Resource Conservation and Recovery Act
RDX	Royal Demolition Explosive (hexahydro-1,3,5-trinitro-1,3,5-triazine)
RI/FS	Remedial investigation and feasibility study
RME	Reasonable Maximum Exposure
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
TRC	Technical Review Committee
TSDF	Treatment, storage, and disposal facility
UCL	Upper Confidence Limit
UBK	Uptake/Biokinetic
UMDA	U.S. Army Depot Activity at Umatilla
USAEC	U.S. Army Environmental Center

1.0 Declaration of the Record of Decision

Site Name and Location

U.S. Army Depot Activity, Umatilla
Miscellaneous Sites Operable Unit
Hermiston, Oregon 97838-9544

Statement of Basis and Purpose

This decision document presents the selected remedial action for the Miscellaneous Sites Operable Unit at the U.S. Army Depot Activity, Umatilla (UMDA), at Hermiston, Oregon. The remedial action has been chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The decision is based on the administrative record for this site.

The remedy was selected by the U.S. Army and the U.S. Environmental Protection Agency (EPA). The State of Oregon concurs with the selected remedy.

Assessment of the Site

Actual or threatened releases of hazardous substances from two sites in this operable unit, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

Description of the Selected Remedy

The selected remedy for this operable unit includes remedial action to reduce the health and environmental risks associated with two sites, the Defense Reutilization Marketing Office (DRMO) [Site 22] and the Building 493 Paint Sludge Discharge Area [Site 36]. The selected remedy of solidification/stabilization is the final remedial action planned for the soils at those two sites. For the remaining sites in the Miscellaneous Sites Operable Unit, the selected remedy is No Further Action.

The major components of the selected remedy include the following:

- Excavation and stockpile of contaminated soil at Sites 22 and 36. This would involve the excavation of approximately 1,700 cubic yards of soil.
- Treatment of contaminated soil in a solidification/stabilization system at a rate of approximately 50 cubic yards per day to produce a cement-like soil mixture.
- Disposal of treated material from the solidification/stabilization system in the UMDA landfill.
- Replacement of excavated soils with clean soil and vegetation/seeding of the area.

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

This remedy is intended to provide sufficient remediation for the scenario of future residential use. Since the remedy will allow unrestricted land use, no five-year reviews are required.

Lead and Support Agency Acceptance of the Record of Decision
U.S. Army Depot Activity Umatilla
Miscellaneous Sites Operable Unit

Signature sheet for the foregoing Record of Decision for the Miscellaneous Sites Operable Unit final action at the U.S. Army Depot Activity at Umatilla between the U.S. Army and the United States Environmental Protection Agency, with concurrence by the Oregon Department of Environmental Quality.

Lewis D. Walker   9/30/94

Lewis D. Walker
Deputy Assistant Secretary of the Army
(Environment, Safety, and Occupational Health)

Date

Lead and Support Agency Acceptance of the Record of Decision
U.S. Army Depot Activity Umatilla
Miscellaneous Sites Operable Unit (continued)

Signature sheet for the foregoing Record of Decision for the Miscellaneous Sites Operable Unit final action at the U.S. Army Depot Activity at Umatilla between the U.S. Army and the United States Environmental Protection Agency, with concurrence by the Oregon Department of Environmental Quality.

Moses Whitehurst Jr.
Lieutenant Colonel Moses Whitehurst, Jr.
Commander, U.S. Army Depot Activity, Umatilla

28 July 94
Date

Lead and Support Agency Acceptance of the Record of Decision
U.S. Army Depot Activity Umatilla
Miscellaneous Sites Operable Unit (continued)

Signature sheet for the foregoing Record of Decision for the Miscellaneous Sites Operable Unit final action at the U.S. Army Depot Activity at Umatilla between the U.S. Army and the United States Environmental Protection Agency, with concurrence by the Oregon Department of Environmental Quality.

Chuck Clarke
Chuck Clarke
Regional Administrator, Region X
U.S. Environmental Protection Agency

7/19/94
Date

Lead and Support Agency Acceptance of the Record of Decision
U.S. Army Depot Activity Umatilla
Miscellaneous Sites Operable Unit (continued)

Signature sheet for the foregoing Record of Decision for the Miscellaneous Sites Operable Unit final action at the U.S. Army Depot Activity at Umatilla between the U.S. Army and the United States Environmental Protection Agency, with concurrence by the Oregon Department of Environmental Quality.

Fred Hansen
Director
Oregon Department of Environmental Quality

JUL 2 6 1994
Date

Note: The Oregon Department of Environmental Quality Letter of Concurrence is appended to this Record of Decision.

Lead and Support Agency Acceptance of the Record of Decision
U.S. Army Depot Activity Umatilla
Miscellaneous Sites Operable Unit (continued)

Signature sheet for the foregoing Record of Decision for the Miscellaneous Sites Operable Unit final action at the U.S. Army Depot Activity at Umatilla between the U.S. Army and the United States Environmental Protection Agency, with concurrence by the Oregon Department of Environmental Quality.

Mark Daugherty
Mark Daugherty
BRAC Environmental Coordinator
U.S. Army Depot Activity, Umatilla

28 July 94
Date

2.0 Decision Summary

This Decision Summary provides an overview of the problems posed by the conditions at the UMDA Miscellaneous Sites, the remedial alternatives, and the analysis of those options. Following that, it explains the rationale for the remedy selection and describes how the selected remedy satisfies statutory requirements.

2.1 Site Name, Location, and Description

UMDA is located in northeastern Oregon in Morrow and Umatilla Counties, approximately 5 miles west of Hermiston, Oregon, as shown in Figure 1. The installation covers 19,729 acres of land, of which 17,054 are owned by the Army and the remaining 2,675 acres are limited to agricultural use by restrictive easement. The Miscellaneous Sites are composed of 32 sites located throughout the UMDA, as shown in Figure 2. Thirty of the sites require no remedial action. Two sites require remedial action: Site 22, the Defense Reutilization Marketing Office (DRMO) and Site 36, the Building 493 Paint Sludge Discharge Area of the UMDA installation.

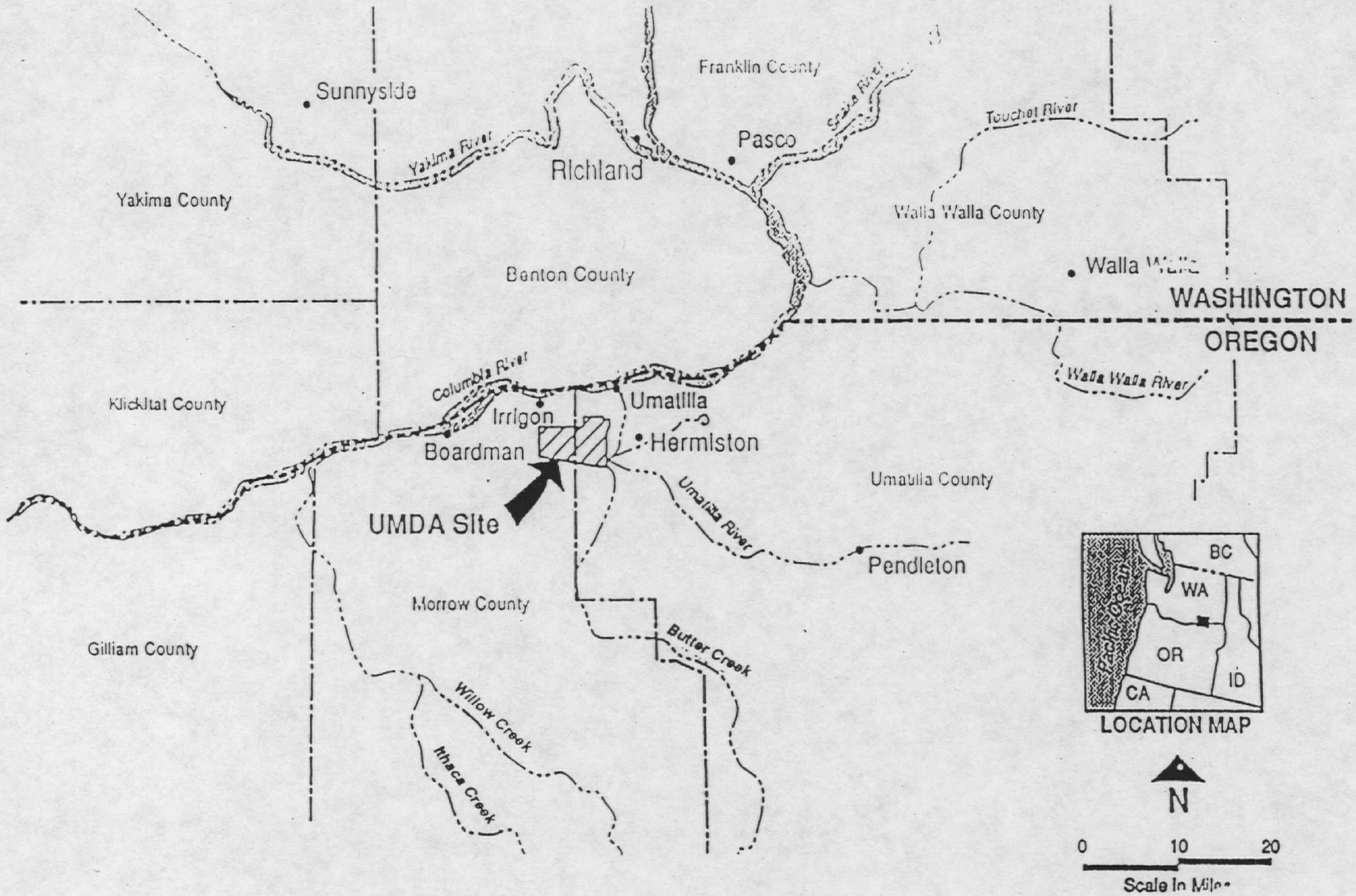
The region surrounding UMDA is primarily used for irrigated agriculture. The population centers closest to UMDA are Hermiston (population 10,075), approximately 5 miles east; Umatilla (population 3,032), approximately 3 miles northeast; and Irrigon (population 820), approximately 2 miles northwest. The total populations of Umatilla and Morrow Counties are approximately 59,000 and 7,650, respectively.

Approximately 1,470 wells have been identified within a 4-mile radius of UMDA, the majority of which are used for domestic and irrigation water. Three municipal water systems (Hermiston, Umatilla, and Irrigon) draw ground water within a 4-mile radius of UMDA. The Columbia River is a major source of potable and irrigation water, and is also used for recreation, fishing, and the generation of hydroelectric power. The principal use of the Umatilla River is irrigation.

Northeastern Oregon, the setting for UMDA, is characterized by a semi-arid, cold desert climate, an average annual precipitation of 8 to 9 inches, and a potential evapotranspiration rate of 32 inches. The installation is located on a regional plateau of low relief that consists of relatively permeable glaciofluvial sand and gravel overlying Columbia River Basalt.

Ground water at UMDA occurs primarily in two settings: in an unconfined aquifer within the overlying deposits and weathered basalts, and in a vertical sequence of semi-confined and confined aquifers within the basalt. Ground water flows trend to the north and northwest. However, regional flow gradients in the uppermost aquifer are influenced by irrigation, pumping, and leakage from irrigation canals. The Columbia River flows from east to west approximately 3 miles to the north of the UMDA boundary, and the Umatilla River flows from south to north approximately 1 to 2 miles to the east. No natural streams occur within UMDA; the facility is characterized by areas of closed drainage.

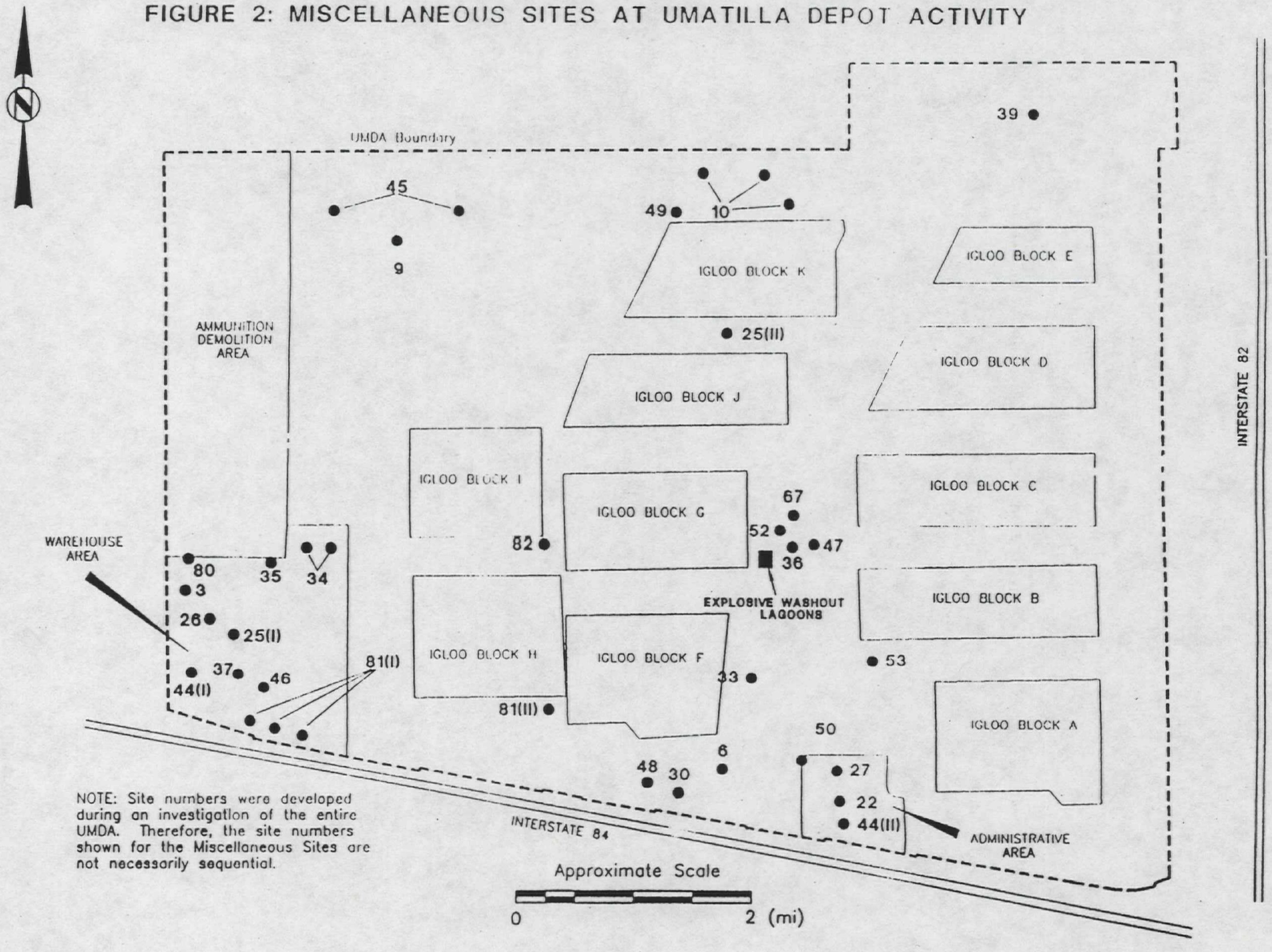
The topography of the UMDA is relatively flat with occasional gently rolling hills or ridges. Elevations are in the range of approximately 460 to 580 feet above mean sea level. Soils at the Miscellaneous Sites typically consist of fine- to medium-grained sand, and vegetation is relatively sparse. Depths to ground water at the Miscellaneous Sites are in the range of approximately 60 to 100 feet below the ground surface.



Source: Arthur D. Little, Inc., 1993, Fig. 1

Figure 1
Facility Location Map
Umatilla Depot Activity

FIGURE 2: MISCELLANEOUS SITES AT UMATILLA DEPOT ACTIVITY



NOTE: Site numbers were developed during an investigation of the entire UMDA. Therefore, the site numbers shown for the Miscellaneous Sites are not necessarily sequential.

2.2 Site History and Enforcement Activities

UMDA was established as an Army ordnance depot in 1941 for the purpose of storing and handling munitions. From 1942 until the present, the ammunition storage and renovation mission at UMDA has involved a variety of industrial type activities. These activities included dismantling, paint removal, and repainting of munitions, disposal of decontamination solutions, storage of metal ores and ingots, storage of scrap material, etc. Access is currently restricted to installation personnel and authorized contractors and visitors. UMDA was included in the Department of Defense (DoD) Base Realignment and Closure (BRAC) Program, which requires that the UMDA conventional ordnance storage mission be transferred to another installation. In view of the DoD's initiatives to promote early reuse of closing installations, property transfer of UMDA could occur in the future.

Thirty-two sites (the Miscellaneous Sites) have been identified as actual or possible locations of Army activities. Specific characteristics of these 32 sites are presented in Table 1.

An initial installation assessment was performed in 1978 and 1979 to evaluate environmental quality at UMDA with regard to the past use, storage, treatment, and disposal of toxic and hazardous materials. Based on aerial imagery analysis provided by EPA's Environmental Photographic Interpretation Center (EPIC) as part of the assessment, the UMDA was characterized as containing potentially hazardous sites. In 1981, Battelle conducted an Environmental Contamination Survey and Assessment at UMDA. This survey and assessment included the sampling and analysis of soils at a number of the Miscellaneous Sites. Also, in 1981, the U.S. Army Environmental Hygiene Agency conducted a Hazardous Waste Management Study at the Miscellaneous Sites in which they sampled and analyzed soils at a limited number of sites.

In 1984, the Explosives Washout Lagoons were evaluated using EPA's Hazard Ranking System (HRS) and received a score in excess of 28.5. As a result, the lagoons were proposed for inclusion on the National Priorities List (NPL) in 49 Fed. Reg. 40320 (October 15, 1984). They were formally listed on the NPL in 49 Fed. Reg. 27620 (July 22, 1987) based on the HRS score and the results of the installation RCRA Facility Assessment.

In 1988, a remedial investigation was performed by Weston. During the investigation, further soil sampling and analysis, as well as ground water sampling and analysis, was performed at a number of the Miscellaneous Sites.

On October 31, 1989, a Federal Facility Agreement (FFA) was executed by UMDA, the Army, EPA Region X, and the Oregon Department of Environmental Quality (ODEQ). The FFA identifies the Army as the lead agency for initiating response actions at UMDA. One of the purposes of the FFA was to establish a framework for developing and implementing appropriate response actions at UMDA in accordance with CERCLA, the NCP, and Superfund guidance and policy. Remediation of contaminated soil at the Miscellaneous Sites was a task identified within this framework. A remedial investigation and feasibility study (RI/FS) of the entire UMDA installation, including the Miscellaneous Sites, was initiated in 1990 to determine the nature and extent of contamination and to identify alternatives available to clean up the facility.

An extensive sampling and analysis program was initiated at the Miscellaneous Sites as part of the RI conducted by Dames & Moore. This investigation included the assessment of soil contamination at each of the 32 Miscellaneous Sites as well as an overall assessment of potential ground water contamination beneath the Miscellaneous Sites. In

Table 1: Miscellaneous Sites Names and General Descriptions (page 1 of 2)

Site Number/Name	Description
3 Hazardous Waste Storage Facility (Building 203)	A portion of Building 203 where hazardous wastes such as battery acid and oil were stored
6 Sewage Treatment Plant	Plant used to treat domestic wastewater generated in the administration area
9 Remote Munitions Disassembly Area	This area was used primarily to disassemble conventional munitions (including very large bombs)
10 Former Agent H Storage Area	This area is a strip of ground formerly used to store 1-ton containers of mustard agent
22 Defense Re-utilization Marketing Office (DRMO)	The site is used to store scrap and salvage materials for reuse or sale
25(I) Metal Ore Piles Location I	Two metal ore piles located to the southeast of Building 200
25(II) Metal Ore Piles Location II	Three metal ore piles are currently located south of K block in the north-central portion of the Depot
26 Metal Ingot Stockpiles	This site, located east of Building 200, consists of 6-foot high stacks of lead and zinc ingots
27 Pesticides Storage Building	A small building in the central portion of the Depot administration area used to store pesticides
29 Septic Tanks	Sixteen active (including two at the Sewage Treatment Plant) and seven inactive septic tanks are located throughout Depot
30 Storm Water Discharge Area	Storm water from the administration area discharges to a small ditch at this site
33 Gravel Pit Disposal Area	This gravel pit may have been used to dispose of decontamination solutions for chemical agents
34 Paint Spray and Shot Blast Areas	Portable shot blast machine and open-air spray paint operations were conducted in Areas 2000 and 2001
35 Malathion Storage Leak Area	A shipment of leaking insecticide containers was received in the late 1970s
36 Building 493 Paint Sludge Discharge Area	Paint sludge, solvents, and possibly other wastes discharged into the coulee near Building 493
37 Building 131 Paint Sludge Discharge Area	A depression to the west of the building used to collect paint sludge and solvents
39 QA Function Range	Two areas used as a rifle range and as QA testing of flares, photoflash grenades, and mines
44(I) Road Oil Application Site-Location I	An area of 100 square feet of hardened road oil material in the southwestern portion of the Depot
44(II) Road Oil Application Site-Location II	A large area of hardened road oil material in the southwestern portion of the Depot Administration Area

Table 1: Miscellaneous Sites Names and General Descriptions (page 2 of 2)

Site Number/Name	Description
45 Building 612 and Building 617 Boilers	Two boiler houses located in the northwestern portion of the Depot with boiler blowdown discharged to soils
46 Railcar Unloading Area	Area near the railroad tracks in the south west portion of the Depot used for coal or ore storage
47 Boiler/Laundry Effluent Discharge Site	Boiler blowdown and laundry wastewaters were discharged to a rock lined pit
48 Pipe Discharge Area	An eight-inch diameter pipe from the sewage treatment plant discharges into a long ravine
49 Drill and Transfer Area	A three-acre site where chemical munitions were drilled, emptied and decontaminated
50 Railroad Landfill Areas	Two landfills located in the south central portion of the Depot, one located north of the railroad tracks and one south of the railroad classification yard
52 Coyote Coulee Discharge Gullies	Three discharge flumes along the Coyote Coulee near the Explosives Washout Plant (Building 489)
53 Building 433 Collection Sump/Cistern and Disposal	An underground sump/cistern 40 feet south of Building 433 used to collect boiler blowdown fluids
67 Building 493 Brass Cleaning Operations Area	Site, south of Building 493, where brass shells were cleaned with cyanide-containing solutions
80 Disposal Pit and Graded Area	A former disposal area located between Eleventh Street and the boundary of the Ammunition Demolition Area
81(I) Former Raw Materials Storage-Location I	Areas in the southwestern warehouse area of the Depot where materials were stored in direct contact with soils
81(II) Former Raw Materials Storage-Location II	Areas in the southeastern corner of Igloo Block H where materials were stored in direct contact with soils
82 Former Gravel Pit/Disposal Location	A former gravel pit that appears to contain asbestos-containing transite siding wastes

addition, this investigation included the evaluation and summary of the prior investigations conducted at the Miscellaneous Sites. Soil and ground water characterization data developed during these investigations were used to develop a human health baseline risk assessment, completed in 1992. Based on information developed in the RI (including the risk assessment), a feasibility study of cleanup actions at the Miscellaneous Sites was completed in 1993.

The documents that outline the results of the site investigations and assessments of cleanup actions for the Miscellaneous Sites are listed in Appendix A.

2.3 Highlights of Community Participation

In 1988, UMDA assembled a Technical Review Committee (TRC), composed of elected and appointed officials and other interested citizens from the surrounding communities. Quarterly meetings provide an opportunity for UMDA to brief the TRC on installation environmental restoration projects and to solicit input from the TRC. Approximately 20 TRC meetings have been held since the initiation of the UMDA RI and throughout the development of the FS of the Miscellaneous Sites Operable Unit. In those meetings, the TRC was informed about the scope and methodology of the Miscellaneous Sites soils investigation and remediation. In December 1993, the TRC was changed to a Restoration Advisory Board (RAB) with similar functions. Two RAB meetings have been held during the final remedy selection for the Miscellaneous Sites. The Feasibility Study Report and Proposed Plan for the Miscellaneous Sites Operable Unit were made available to the public on February 15, 1994 at the following locations: Building 32, UMDA; the Hermiston Public Library, Hermiston, Oregon; and the EPA office in Portland, Oregon. The notice of availability of the Proposed Plan was published in the *Hermiston Herald*, the *Tri-City Herald*, and the *East Oregonian* on February 15, 1994. The public comment period ended on March 17, 1994.

A public meeting was held at the Armand Larive Junior High School, Hermiston, Oregon, on March 2, 1994, to inform the public of the preferred alternative and to seek public comments. At this meeting, representatives from UMDA, the U.S. Army Environmental Center (USAEC), EPA, ODEQ, and Arthur D. Little, Inc. (an environmental consultant to USAEC) answered questions about the site and remedial alternatives under consideration. A response to comments received at the meeting and during the 30-day comment period is included in Section 3.0, Responsiveness Summary.

2.4 Scope and Role of Response Action

Response actions are discrete actions that constitute incremental steps toward a final overall remedy. They can be actions that completely address a geographic portion of a site or a specific problem, or can be one of many actions that will be taken at the site. At UMDA, response actions are directed at eight areas identified as operable units based on the results of the RI. These operable units are:

- Inactive Landfills
- Active Landfill
- Explosives Washout Lagoon Soils
- Explosives Washout Lagoon Ground Water
- Explosives Washout Plant
- Deactivation Furnace (and surrounding soils)
- Ammunition Demolition Activity Area (ADA)
- Miscellaneous Sites

Most of the Miscellaneous Sites are clustered in the southwestern or southern portions of the depot. The southwestern cluster of sites centers on warehousing, railroad unloading, and stockpiling activities. The southern sites include the administrative areas as well as support activities such as sewage treatment and storm water discharges. The remaining Miscellaneous Sites are spread throughout UMDA and relate to a variety of support facilities for mission activities.

2.5 Site Characteristics

The Miscellaneous Sites have served a wide variety of specific functions, including sewage treatment and storm water discharges, munitions disassembly, Defense Reutilization Marketing Area (recycle materials stockpile), ground storage of raw materials, metal ingot storage, pesticide storage, paint spray and removal area, paint sludge discharge areas, boiler/laundry wastewater discharge areas, disposal pits, and hazardous waste storage. (Table 1 provides a general description of each of the 32 Miscellaneous Sites). The types of contamination include:

- Organic compounds
- Metal salts
- Pesticides (through application or disposal)

2.5.1 Results of Soil Investigations

Several soil investigations have been conducted at the Miscellaneous Sites since 1981. Samples collected from the soil surface and from soil borings have been used to determine the vertical and horizontal extent of soil contamination. The soil samples were taken based on historical records of site activities and employee interviews to document possible locations of contamination. When contamination was found in initial rounds of sampling, more samples and samples at greater depth were collected to help define the extent of the contamination. From 5 to 40 samples were taken at each site depending on the size of the site. The soil samples were taken from the surface to depths of approximately 10 feet. A full description of the sampling program may be found in the Remedial Investigation report.

Investigation results are presented in Table 2. The sites in Table 1 that are not in Table 2 did not have any contaminants of concern. In identifying these contaminants, it was assumed that soil at depths greater than 10 feet would not be available for exposure; therefore, only soils collected from 10 feet or shallower were included in the analysis of investigation results. The contaminants presented in Table 2 are those that were positively detected in at least one sample and were found to be present in concentrations greater than naturally occurring background concentrations. Background concentrations in soil were obtained from ten soil borings on property adjacent to the UMDA. Five samples were taken from each boring, and the highest measured concentration was used as background.

For reference, Table 2 includes measures of the average contaminant concentration (to depths of 2 feet) and the frequency at which the contaminant was detected at this depth.

At two sites (47 and 67), soil samples were taken from a depth of 10 feet. Results indicate a lower concentration of contaminants at the greater depth. This, together with the relative immobility of contaminants and the depth to ground water (approximately 60 feet), indicates little potential for ground water contamination due to contaminants in soil at the Miscellaneous Sites.

Table 2: Summary of Contaminants of Concern in Soil

Site	Contaminant of Concern	95% UCL Concentration to 2-foot depth ug/g	Frequency of Detection		95% UCL Concentration to 10-foot depth ug/g	Frequency of Detection		Background Concentration ug/g (a)
9	Antimony	13.6	6/6		N/A			3.8
	Cadmium	4.21	1/6		N/A			3.05
	Lead	78	6/6		N/A			8.37
	Silver	0.053	6/6		N/A			0.038
	Zinc	229	6/6		N/A			94
	HMX	1.43	1/6		N/A			NSA
	RDX	0.69	1/6		N/A			NSA
22	Antimony	85.5	3/11		N/A			3.8
	Cadmium	26.1	3/11		N/A			3.05
	Copper	2045	5/11		N/A			58.6
	Lead	2668	11/11		N/A			8.37
	Silver	0.332	9/11		N/A			0.038
	Zinc	1286	11/11		N/A			94
	DDD	0.103	3/11		N/A			NSA
	DDE	0.128	6/11		N/A			NSA
	DDT	0.353	6/11		N/A			NSA
25I	Lead	8.39	6/6		N/A			8.37
	Thallium	35.3	3/6		N/A			31.3
25II	None				N/A			
26	Lead	42.3(b)	2/2		N/A			8.37
	Zinc	230(b)	2/2		N/A			94
36	Cadmium	478	3/5		N/A			3.05
	Chromium (d)	127	2/5		N/A			32.7
	Cobalt	18.6	1/5		N/A			15
	Copper	99.3	1/5		N/A			58.6
	Iron	29396	5/5		N/A			26233
	Lead	199	5/5		N/A			8.37
	Nickel	32.2	1/5		N/A			12.6
	Silver	0.23	2/5		N/A			0.038
	Zinc	6530	5/5		N/A			94
37	Barium	303	4/4		N/A			233
	Cadmium	5.87	2/4		N/A			3.05
	Chromium (d)	124	2/4		N/A			32.7
	Lead	355	4/4		N/A			8.37
	Mercury	0.327	2/4		N/A			0.056
	Zinc	233(b)	3/4		N/A			94
47	Antimony	142	1/7		68	1/14		3.8
	Barium	420	7/7		258	14/14		233
	Cadmium	21.5	1/7		10.9	1/14		3.05
	Calcium	66512	7/7		34457	14/14		29006
	Chromium (d)	36.9	1/7		N/A	N/A		32.7
	Copper	240	1/7		128	1/14		58.6
	Lead	401	7/7		193	14/14		8.37
	Magnesium	14825	7/7		9299	14/14		8585
	Mercury	0.533	6/7		0.338	8/14		0.056
	Nickel	44.4	2/7		24.7	2/14		12.6
	Selenium	0.282	2/7		N/A	N/A		0.25

Table 2: Summary of Contaminants of Concern in Soil (continued)

Site	Contaminant of Concern	95% UCL Concentration to 2-foot depth ug/g	Frequency of Detection	95% UCL Concentration to 10-foot depth ug/g	Frequency of Detection	Background Concentration ug/g (a)
47	Silver	0.449	2/7	0.219	2/14	0.038
	Zinc	895	5/7	449	9/14	94
	Benzo[A]Anthracene	0.249(b)	1/7	0.249(b)	1/14	NSA
	Benzo[B]Fluoranthene	0.449(b)	2/7	0.449(b)	1/14	NSA
	Benzo[K]Fluoranthene	0.23(b)	2/7	0.23(b)	2/14	NSA
	Chrysene	0.481(b)	2/7	0.481(b)	3/14	NSA
	Di-n-ButylPhthalate	0.813	1/7	0.421	1/14	NSA
	Fluoranthene	0.294(b)	2/7	0.294(b)	3/14	NSA
	Phenanthrene	0.093(b)	2/7	0.093(b)	2/14	NSA
	Pyrene	0.325(b)	2/7	0.249	3/14	NSA
	Chlordane	0.303	1/7	0.147	1/14	NSA
	DDD	0.109	1/7	0.054	1/14	NSA
	DDE	0.008	2/7	0.006	2/14	NSA
	DDT	0.057	2/7	0.03	2/14	NSA
	PCB-1260	0.319	1/7	0.171	1/14	NSA
	Nitrite/nitrate	18.6	5/7	10.3	10/14	9.9
48	Cadmium	6.47(b)	1/3	N/A		3.05
	Copper	118(b)	1/3	N/A		58.6
	Lead	68.6(b)	3/3	N/A		8.37
	Mercury	0.85(b)	2/3	N/A		0.056
	Silver	2.8(b)	3/3	N/A		0.038
	Zinc	467(b)	3/3	N/A		94
	DDD	7.4(b)	3/3	N/A		NSA
	DDE	1.94(b)	2/3	N/A		NSA
	DDT	1.16(b)	2/3	N/A		NSA
	Nitrite/nitrate	20(b)	3/3	N/A		9.9
50	Arsenic	5.51	4/5	N/A		1
	Copper	7.42	2/5	N/A		1
	Cyanide	12.1	1/5	N/A		NSA
	Nickel	53.8	2/5	N/A		NSA
	Vanadium	30.9(b)	4/4	N/A		NSA
	Zinc	523	2/5	N/A		74
	RDX	2.55		N/A		NSA
52	Copper	123	1/8	N/A		58.6
	Lead	15.7	8/8	N/A		8.37
	Zinc	136	8/8	N/A		94
	HMX	0.582	1/8	N/A		NSA
	RDX	0.864	1/8	N/A		NSA
67	Lead	43(c)	1/1	28.7	5/5	8.37
	Silver			0.044	3/5	0.038

NOTES:

UCL - Upper confidence limit

NSA - No standard available

N/A - Not analyzed at this depth

(a) Background concentration as established in RI

(b) Maximum detected concentration (if it exceeds 95% UCL)

(c) Concentration detected in single sample

(d) Total chromium

In general, the chemical contaminants in soil at the Miscellaneous Sites can be characterized as having relatively low aqueous solubilities and low volatilities. Potential routes for their migration include the following:

Air
Airborne transport of soil contaminants is the most likely route of contaminant migration at the Miscellaneous Sites. Airborne transport of soil contaminants might occur via the dispersion of soil particles, particularly if soil-disturbing activities are performed at the site. Volatilization of soil contaminants is unlikely given their low volatility.

Surface Water
There is little potential for surface water transport of the contaminants. The sites are not located within a floodplain, and there is virtually no run-on or runoff from the sites. The low precipitation rate and high soil permeability allow for ready percolation of any rain falling directly onto the soils.

Subsurface
Infiltration of precipitation provides a potential subsurface pathway for migration of contaminants in the soil at the Miscellaneous Sites. However, the rate of transport is expected to be low due to the low precipitation and high evaporation rates in the region. This conclusion is supported by the RI data showing a decrease in contaminant concentrations from the surface to the subsurface. The depth to ground water at the Miscellaneous Sites (typically in excess of 60 feet), combined with the low rate of transport of contaminants through the subsurface soils, makes ground water contamination due to the migration of contaminants at the Miscellaneous Sites unlikely.

2.5.2 Results of Ground Water Investigation
During the RI, sampling and analysis of ground water was performed at sites where records of past use indicated a potential for groundwater contamination (Sites 47, 50, and 67). Table 3 presents the contaminants at these sites that were positively detected in at least one sample and were found to be present in concentrations greater than naturally occurring background concentrations. For reference, this table includes measures of the average concentration and the frequency at which the contaminants were detected. Ground water background concentrations were obtained from well data published by the Oregon DEQ for the northeast Oregon area.

Despite the presence of inorganic elements or organic compounds in the ground water beneath Sites 47, 50, and 67 there is no evidence that migration of contaminants in soil at these sites was, or in the future would be, responsible for ground water contamination. Sites 47 and 67 are located over the ground water plume of the explosives washout lagoons. The contaminants found in the ground water beneath these sites is consistent with the contamination in the ground water plume originating from the explosives washout lagoons. This ground water plume is addressed in the Washout Lagoons Operable Unit.

2.6 Summary of Site Risks

This section summarizes the human health risks and environmental impacts associated with exposure to Miscellaneous Sites contaminants and provides potential remedial action criteria.

2.6.1 Human Health Risks
A human health baseline risk assessment was conducted by the Army to estimate the risk posed to human health by the Miscellaneous Sites should they remain in their current state

Table 3: Summary of Contaminants of Concern in Ground Water

Site	Contaminant of Concern	95% UCL Concentration ug/L	Frequency of Detection	Background Concentration ug/L (a)
47, 67	Antimony	2.9	2 of 13	1
	Arsenic	15	13 of 13	1
	Chromium	11	6 of 13	1
	Copper	7.16	3 of 13	1
	Lead	5.84	6 of 13	5
	135TNB	47.1	17 of 89	NSA
	246TNT	418	12 of 89	NSA
	24DNT	49.8	9 of 89	NSA
	HMX	160	14 of 89	NSA
	RDX	729	52 of 89	NSA
50	Arsenic	5.51	4 of 5	1
	Copper	7.42	2 of 5	1
	Cyanide	12.1	1 of 5	NSA
	Nickel	53.8	2 of 5	NSA
	Vanadium	30.9	4 of 4	NSA
	Zinc	523	2 of 5	40
	RDX	2.55	1 of 5	NSA

NOTES:

UCL - Upper Confidence Limit

NSA - No Standard Available

(a) - Background concentration as established in RI with no remediation. The risk assessment consisted of an exposure assessment, toxicity assessment, and human health risk evaluation. The exposure assessment detailed the exposure pathways (such as dust inhalation) that exist at the site for various receptors. The toxicity assessment documented the adverse effects that can be caused in a receptor as a result of exposure to a site contaminant. The human health risk evaluation used information on the amounts of contamination identified in the remedial investigation, the toxicity of those contaminants, and possible human exposure to the contaminants.

Health risks contain components arising from a contaminant's carcinogenic potential or its potential to cause health risks other than cancer. The cancer risk level is the additional chance that an exposed individual will develop cancer over the course of a lifetime. It is expressed as a probability such as 1×10^{-6} (one in a million). Total noncarcinogenic health risks are expressed as a hazard index (HI). In general, an HI of less than or equal to 1 indicates that even the most sensitive population is not likely to experience adverse health effects. If it is above 1, there might be a concern for adverse health effects. The degree of concern typically correlates with the magnitude of the HI if it is above 1.

Risk assessments involve calculations based on a number of factors, some of which are uncertain. First, the health effects criteria of specific chemicals are often based on limited laboratory studies on animal species that are then extrapolated to humans. Further, the exposure scenario requires estimation of the duration and frequency of exposure, the identity of the exposed individual, and the contaminant concentration at the point of exposure. If the value of the factor required for the risk assessment is uncertain, a conservative estimate is used so that a health-based exposure level or concentration can be calculated. For example, in order to calculate a reference dose for humans, toxicity assessments divide doses observed to cause health effects in animals by an uncertainty factor to account for species differences and human population variability. In the case of uncertainties associated with exposure scenarios, the most conservative, plausible scenario is selected. For example, in the Miscellaneous Sites risk assessment, risk values for future use exposures were calculated for a residential use scenario because it represented the most conservative future use scenario.

Primary databases and models (and their sources) used in the risk assessment to develop toxicity information and health effects assumptions and criteria include:

- Integrated Risk Information System (IRIS) (EPA, 1991)
- Health Effects Assessment Summary Tables (HEAST) (EPA, 1991)
- Standard Default Exposure Factors (EPA, 1991)
- Uptake/Biokinetics (UBK) Model for Lead (EPA, 1991)

The use of these databases and models is described in detail in the Final *Human Health Baseline Risk Assessment* (Dames & Moore, 1992b).

Risks of Contaminants of Concern in Soil

Contaminants of concern at the Miscellaneous Sites include those contaminants that were found in soil in concentrations above the background concentration determined for that contaminant. Based on this criterion, the following were identified as contaminants of concern at the Miscellaneous Sites:

- Antimony
- Arsenic
- Barium
- Cadmium
- Calcium
- Chromium
- Cobalt
- Copper
- Iron
- Lead
- Magnesium
- Mercury
- Nickel
- Selenium
- Silver
- Thallium
- Vanadium
- Zinc
- Nitrate/nitrite
- HMX
- RDX
- Benzo (a) anthracene
- Benzo (b) fluoranthene
- Benzo (k) fluoranthene
- Chrysene
- Di-n-butyl phthalate
- Fluoranthene
- Phenanthrene
- Pyrene
- Chlordane
- DDD
- DDE
- DDT
- PCB 1260

The populations at risk of exposure to these contaminants were identified by considering both current and future use scenarios. Currently, public access to the UMDA facility is restricted, and there is little incentive or opportunity for trespassers to approach the Miscellaneous Sites, so public exposure is unlikely. There are no plans to disturb the soil, so unplanned exposure of installation personnel is also unlikely.

The probability of future exposure to human receptors was considered high, since it is likely that DoD will eventually vacate UMDA. Future residential use was selected as the future land use in the risk assessment since it provides the most conservative approach, and it is a possible usage scenario for the Miscellaneous Sites.

Concentrations of soil contaminants used in the calculation of the baseline risk assessment were Reasonable Maximum Exposure (RME) concentrations. These concentrations are assumed to be the 95 percent upper confidence limit (UCL) on the arithmetic mean of sampling data (values presented in Table 2) unless the UCL is above the maximum detected value, in which case the maximum detected value is used. Using these concentrations and exposure factors obtained from EPA's *Risk Assessment Guidance for Superfund*, chronic daily intake factors for each chemical within each exposure pathway for a given population at risk were calculated.

Using the toxicity and health effects data available and the calculated chronic daily intake factors, excess cancer risks and noncancer HIs were calculated for current and future use scenarios.

Results of the calculations for current land use scenarios are presented in Table 4. As shown, of the current receptors, the highest risks and hazards apply to workers at Building 419 near the explosives washout area, where the multiple pathway risk is 8×10^{-8} with a corresponding hazard index of less than 1.

A summary of risks and hazards posed by exposures to contaminated soil associated with the future use of the Miscellaneous Sites is presented in Table 5. These risks and hazards were calculated for each of the Miscellaneous Sites where contamination was present in soil and represent future residential use, the most conservative future use scenario. The exposure pathways used to calculate the values presented in Table 5 include dermal absorption of chemicals in soil (Pathway 1), incidental ingestion of soil (Pathway 2), and dust inhalation (Pathway 3).

As shown, the excess cancer risks associated with direct soil contact by future residents, assuming a reasonable maximum exposure scenario, are 1×10^{-6} or less for all sites.

The noncancer hazard indices associated with direct soil contact by future residents assuming a reasonable maximum exposure scenario are greater than one for Sites 25I, 36, and 47. At all 3 sites, the incidental ingestion of soil is the exposure route that contributes the most to the value of the noncancer hazard indices. Most of the hazard is due to thallium at Site 25I, cadmium at Site 36, and antimony and cadmium at Site 47.

As discussed earlier, acceptable exposure levels are usually evaluated in terms of the HI. If the HI is approximately 1 or less, it generally represents an acceptable exposure. It is acknowledged that the HIs are probably overestimated, because combining HIs assumes that toxic effects are additive within the human body, when, in fact, chemicals with different mechanisms of toxic action may act independently. Since the HIs at sites 25I and 47 are relatively close to a value of 1, and since the HI criteria is conservative, the soils at these two sites will not require remediation. The soils at Site 36 with a HI of 9 will be remediated.

The NCP states that the acceptable risk range for carcinogens is 1×10^{-4} to 1×10^{-6} [40 CFR 300.430(e)(2)(i)(A)(2)]. For systemic toxicants (i.e., constituents having a noncancer health effect), the NCP states the following:

> For systemic toxicants, acceptable exposure levels shall represent concentration levels to which human populations, including sensitive subgroups, may be exposed without adverse effect during a lifetime or part of a lifetime, incorporating an adequate margin of safety. [40 CFR 300.430(e)(2)(i)(A)(1)]

In addition to the cancer and noncancer risk calculation results presented in Table 5, an analysis of risks posed by lead was performed. To determine the potential exposure to lead, an uptake/biokinetics model was used in the risk assessment. The level of lead that is determined to present an unacceptable risk to human health is established as a site-specific value based on applicable regulatory guidance, including:

As a result of the risk assessment and consideration of regulatory guidance, a lead cleanup level of 500 ppm was established at the Miscellaneous Sites. This means that sites with lead concentrations in soil of 500 ppm or greater would present an unacceptable threat to human health.

The potential risks associated with exposure to soil contamination by future residents exceed the acceptable carcinogenic risk range, noncarcinogenic hazard level, or action level for lead at the following sites:

- Site 22 (95 percent UCL lead = 2,668 ppm)
- Site 36 (HI =9)

These sites will require remediation.

The potential risks associated with exposure to soil contamination by future residents are within or below the acceptable carcinogenic risk range, noncarcinogenic hazard level, and action level for lead at Sites 3, 6, 9, 10, 25I, 25II, 26, 27, 29, 30, 33, 34, 35, 37, 39, 44I, 44II, 45, 46, 47, 48, 49, 50, 52, 53, 67, 80, 81I, 81II, and 82.

Table 4: **Summary of Total Risks and Hazard Indices Related to Exposure to Soil for Current Land Use Scenarios**

Receptor	Exposure Pathway(s)	Cancer Risk	Hazard Index
Worker near explosives washout area at Building 41	Dust inhalation	8×10^{-8}	<1
Worker in southwest warehouse area	Dust inhalation Incidental soil ingestion Dermal contact with soil	4×10^{-8}	<1
Worker near DRMO	Dust inhalation	2×10^{-8}	<1
Pesticide worker	Dust inhalation	5×10^{-8}	<1
Eastern boundary resident	Dust inhalation	8×10^{-8}	<1
Hermiston resident	Dust inhalation	6×10^{-8}	<1
Western boundary resident	Dust inhalation	7×10^{-8}	<1
Irrigon resident	Dust inhalation	1×10^{-8}	<1

Table 5: Summary of Risks and Hazard Indices Related to Exposure to Soil for Future Residential Users

Site	Exposure Pathway(s)	Cancer Risk	Hazard Index
3	(a)	(a)	(a)
6	(a)	(a)	(a)
9	1,2,3	8×10^{-7}	0.3
10	1,2,3	(a)	0.06
22	2,3	3×10^{-7}	1
25I	2,3	(a)	2
25II	2,3	4×10^{-9}	1
26	2,3	(a)	0.005
27	2,3	1×10^{-8}	0.004
29	(a)	(a)	(a)
30	2,3	1×10^{-6}	0.01
33	(a)	(a)	(a)
34	2,3	2×10^{-7}	0.06
35	2,3	3×10^{-7}	0.002
36	2,3	8×10^{-7}	9
37	2,3	1×10^{-6}	0.2
39	2,3	(a)	0.06
44I	(a)	(a)	(a)
44II	(a)	(a)	(a)
45	2,3	2×10^{-8}	0.1
46	2,3	3×10^{-7}	0.05
47	1,2,3	1×10^{-7}	2
48	2,3	(a)	0.1
49	(a)	(a)	(a)
50	(b)	(b)	(b)
52	1,2,3	1×10^{-7}	0.02
53	2,3	7×10^{-9}	0.09
67	2,3	(a)	0
80	(a)	(a)	(a)
81I	(a)	(a)	(a)
81II	2,3	(a)	0.00003
82	(a)	(a)	(a)

Notes:
(a) No contaminant(s) of concern detected
(b) Risks were not calculated because exposure pathways were incomplete

Exposure Pathways
1 - Dermal absorption of chemicals in soil
2 - Incidental ingestion of soil (this exposure pathway generally accounts for most of the hazard)
3 - Dust inhalation

Risks of Contaminants of Concern in Ground Water

A summary of risks and hazards posed by exposures to ground water associated with the future use of the Miscellaneous Sites (based on a very limited sampling program as shown in Table 3) is presented in Table 6. These risks and hazards represent future residential use, the most conservative future use scenario. The exposure pathways used to calculate the values presented in Table 6 include one or more of the following:

- Ingestion of ground water (Pathway 5)
- Inhalation of volatile contaminants emitted from ground water during showering (Pathway 6)
- Dermal absorption of ground water during showering (Pathway 7)
- *Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites*, EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.4-02, September 1, 1989
- Supplement to above guidance, OSWER Directive 9355.4-02A, January 26, 1990
- *Update on OSWER Soil Lead Cleanup Guidance*, August 29, 1991

As shown in Table 6, ground water-related risks and hazards exceed the future residential use criteria (risk of 1×10^{-6} and HI of 1) at Sites 47, 50, and 67. The exceedences in risk-based values at Sites 47 and 67 are due to the contamination plume from the Explosives Washout Lagoons. That ground water is addressed as a separate Operable Unit (OU-3) for the ground water from the Explosives Washout Lagoons.

The risk exceedence at Site 50 is due only to arsenic. However, it is likely that the concentration of arsenic in ground water at this site (5.5 µg/L) represents background because the value established in the RI as background (1 µg/L) was a conservative concentration based on very limited sampling, and arsenic was measured at concentrations above 5.5 µg/L consistently across the UMDA. In addition, the arsenic concentration in ground water at Site 50 is well below the regulatory maximum contaminant level (MCL) of 50 µg/L.

2.6.2 Environmental Evaluation

As part of the remedial investigation, an ecological assessment (EA) was performed for UMDA. Qualitative ecological observations and literature information were included in the feasibility study for the Miscellaneous Sites Operable Unit. Although the UMDA installation is part of the critical winter range and habitat for several threatened and endangered avian species, as defined under the Endangered Species Act (40 CFR 502), none of these species are now directly affected by the Miscellaneous Sites, nor are they likely to be in the future.

Although there are a number of wetlands near UMDA, none of these occur within the UMDA boundaries. Information available also indicates that UMDA is not located within 100 or 500 year floodplains. Also there are no wilderness areas, wildlife refuges or scenic rivers located within the boundaries of UMDA.

There are two known historic buildings at UMDA, the headquarters building and the firehouse building. There are also two potential archeological resources at UMDA that have been tentatively identified as a portion of the Oregon Trail and a prehistoric site. However, none of the activities at the Miscellaneous Sites would affect these locations.

The EA involved a process to evaluate the current and potential effect to site biota from contaminants in soil at UMDA. In this process, the toxicity and environmental fate of contaminants of concern were evaluated on an installation-wide basis for contaminants

Table 6: Summary of Risks and Hazard Indices Related to Exposure to Ground Water for Future Residential Users

Site	Exposure Pathway(s)	Cancer Risk	Hazard Index
47	5,6,7	3×10^{-3}	30
50	5,7	1×10^{-4}	0.8
67	5,6,7	2×10^{-3}	60

Notes:
Exposure Pathways
5 - Ingestion of ground water
6 - Inhalation of volatile contaminants emitted from ground water during showering
7 - Dermal absorption of ground water contaminants during showing

found at or near the surface. The chronic toxicities imposed by the contaminants of concern were developed by calculating the ratio of estimated daily contaminant uptake rates to no observed adverse effect levels (NOAELs) for four indicator species: field mouse, pronghorn antelope, American badger, and Swainson's hawk. Daily contaminant uptake rates are a function of contaminant concentration and exposure pathways. Exposure pathways considered in this assessment include direct or indirect ingestion of soil by the indicator species. The ratio of contaminant uptake rates to NOAELs is represented by a hazard quotient (HQ) for each of the contaminants of concern.

The EA addressed several typical contaminated sites throughout UMDA including one of the Miscellaneous Sites (Site 30). A summary of the results for this site is presented in Table 7. At Site 30, lead was the only contaminant with an HQ high enough to suggest low to moderate potential health effects in a worst-case, long-term exposure scenario. Although the concentration of lead at Site 30 is greater than background, it is less than the action level established for lead in soil.

Even with the worst-case exposure assumptions, the calculated HQs are not considered significantly high enough compared to the high degree of uncertainty inherent in the ecological risk assessment to justify remedial action.

2.6.3 Remedial Action Goals

Neither state nor federal regulations contain chemical-specific soil cleanup standards for the contaminants of concern. However, both authorities provide a framework for developing risk-based remedial action goals. The State of Oregon requires cleanup to background or, if that is not feasible, the lowest levels that are protective of human health and the environment and are feasible. The NCP provides guidelines in terms of acceptable carcinogenic and noncarcinogenic risk.

Although Toxicity Characteristic Leaching Procedure (TCLP) tests were not performed at all sites, contamination levels are high enough that some soils may be RCRA characteristic wastes if excavated. TCLP testing will be performed during remedial design and remedial action to ensure that RCRA wastes are properly handled, treated, and disposed of.

Potential remedial action criteria (RAC) were calculated based on direct contact with Miscellaneous Sites soils. RAC for the contaminants of concern at the sites to be subjected to remedial action are presented in Table 8. These RAC represent soil concentrations for future residential and industrial uses equivalent to excess cancer risks of 1×10^{-6} and 1×10^{-5}, and/or noncancer risks with HIs of 1. For reference and comparison, background concentrations and certified reporting limits for each of the contaminants of concern are also provided.

From the RAC presented in Table 8, cleanup levels were selected. These levels are based on possible future residential use of the Miscellaneous Sites, with the objective of reducing excess cancer risks to 1×10^{-6} or noncancer risks to 1 or less (or meeting the action level of 500 ppm for lead that is equivalent to a safe blood lead level for 95 percent of children). Where these values were at, or very close to, background concentrations or analytical detection limits, they were increased to represent technically feasible criteria while maintaining adequate protectiveness for possible future users of the Miscellaneous Sites. The contamination at these sites is contained in 1,700 cubic yards of soil that is within 1 foot of the surface at Site 22 and within 3 feet of the surface at Site 36. Cleanup levels for each of the contaminants of concern at Sites 22 and 36 are presented in Table 9.

Table 7: Environmental Risk Characterization Summary

Indicator Species	Principal Contaminant of Concern	Worst-Case Chronic HQ (Site)	Comments
Field Mouse	Lead	14.4 (30)	Silver, zinc, and DDT were not chronic toxicity hazards. Toxicological data were not available for other contaminants.
Pronghorn			Lead, zinc, and DDD were not chronic toxicity hazards. Toxicological data were not available for other contaminants
Badger			Lead chronic HQ was slightly above one. Silver, zinc, and DDT were not chronic hazards. Toxicological data were not available for other contaminants
Hawk	Lead	6.49 (30)	DDD, DDE, and DDT were not chronic toxicity hazards. Toxicological data were not available for other contaminants

Table 8: Risk-Based Remedial Action Criteria

Contaminant of Concern	CRLs(a) ppm	Background(b) ppm	Risk-Based Remedial Goals: Residential Risk-based (c) ppm	Light Industrial Risk-based (d) ppm	Light Industrial Risk-based (e) ppm
Antimony	3.8	3.8	110	818	818
Barium	29.6	233	13700	861	861
Cadmium	3.05	3.05	127	2.75	27.5
Chromium	12.7	32.7	19	0.413	3.71
Cobalt	15	15	2.74	20.2	20.2
Copper	58.6	58.6	10100	75,600	75,600
Lead	6.62	8.37	(f)	(f)	(f)
Mercury	0.05	0.056	81.9	292	292
Nickel	12.6	12.6	470	10.2	102
Selenium	0.25	0.25	1370	10200	10200
Silver	0.025	0.038	1370	10200	10200
Thallium	31.3	31.3	21.9	164	164
Vanadium	0.775	131	1920	14300	14300
Zinc	30.2	94	54800	409,000	409,000
Cyanide	0.242	0.92	5480	40900	40900
Nitrate/nitrite	0.6	9.9	438000	NA	NA
HMX	0.666	NSA	1050	2270	2270
RDX	0.587	NSA	5.81	52	520
Benzo(a)anthracene	0.17	NSA	0.11	0.732	7.32
Benzo(b)fluoranthene	0.21	NSA	0.11	0.732	7.32
Benzo(k)fluoranthene	0.66	NSA	0.11	0.732	7.32
Chrysene	0.12	NSA	0.11	0.732	7.32
Di-n-butyl phthalate	0.061	NSA	27400	204000	204000
Fluoranthene	0.068	NSA	10900	81800	81800
Pyrene	0.033	NSA	8210	61300	61300
Chlordane	0.018	NSA	0.491	3.31	33.1
DDD	0.008	NSA	2.66	23.8	238
DDE	0.008	NSA	1.88	16.8	168
DDT	0.007	NSA	1.88	12.7	127
PCB 1260	1.08	NSA	0.083	0.108	1.08

Notes:
(a) Certified Reporting Limit used in RI
(b) Background Concentration established in RI
(c) Based on a Residential cancer risk of 1E-06 or an HQ of 1
(d) Based on a Light Industrial cancer risk of 1E-06 or an HQ of 1
(e) Based on a Light Industrial cancer risk of 1E-05 or an HQ of 1
(f) Action level for lead established at 500 ppm
NA - Not available or not applicable
NSA - No standard available

Table 9: Cleanup Levels for Contaminants at the Miscellaneous Sites

Contaminant	Cleanup Level (ppm)	Background Level (ppm)	Concentration in Soils (a) (ppm)	
			Site 22	Site 36
Antimony	110	3.8	85.5	NA
Cadmium	127	3.05	26.1	478
Chromium	40	32.7	10.6	127
Cobalt	25	15	NA	18.6
Copper	10100	58.6	2045	99.3
Lead	500	8.37	2668	199
Nickel	470	12.6	NA	32.2
Silver	1370	0.038	0.322	0.23
Zinc	54800	94	1286	1530
DDD	3	NSA	0.103	NA
DDE	2	NSA	0.128	NA
DDT	2	NSA	0.353	NA

Notes:
(a)–95% UCL Concentration (shading indicates that concentration is above the cleanup level)
NA–Not analyzed
NSA–No standard available
ppm–Parts per million

This table also shows the maximum 95 percent UCL concentrations of the contaminants at each of the sites. From this table it can be observed that the following contaminants are present at the sites in concentrations greater than the selected cleanup level:

- Cadmium
- Chromium
- Lead

Actual or threatened releases of the hazardous substances from Sites 22 and 36 in this operable unit, if not addressed by implementing the response action in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

Since the ground water is being remediated as part of another operable unit and does not pose a threat, no remedial action is required for the cleanup of ground water in the Miscellaneous Sites Operable Unit.

2.7 Description of Alternatives

A range of general response actions was considered for remediating Sites 22 and 36 of the UMDA Miscellaneous Sites Operable Unit. The actions were first screened for general applicability for the treatment of metal contaminants in soil, then several that appeared to be appropriate for the site were evaluated for effectiveness, implementability, and, to a lesser extent, cost. The actions evaluated included:

- No action
- Institutional controls (access restrictions, land use restrictions)
- Containment (engineered cap, soil cover, vegetative cover, surface controls)
- On-site disposal
- In situ treatment (biological, physical-chemical, thermal)
- Ex situ treatment (biological, physical-chemical, thermal, off-site treatment/disposal)

From this evaluation, five remedial alternatives were assembled that contained one or more elements from the responses listed above:

Alternative 1: No Action

Alternative 2: Containment of Contaminated Soil by Soil Cover [Option A] or Clay Cap [Option B]

Alternative 3: On-Site Treatment of All Contaminated Soil by Solidification/Stabilization and On-Site [Option A] or Off-Site [Option B] Disposal

Alternative 4: Off-Site Treatment and Disposal

Alternatives 3 and 4 involve the disposal of treated soils and residues in the on-site UMDA landfill. This landfill is located in the eastern portion of UMDA. Under an agreement entered into by the Army and ODEQ, this landfill will cease receipt of municipal waste in mid-1994, but may receive treated soils until late March 1998. The Army is currently in the process of preparing a closure plan for the landfill in accordance with its permit and ODEQ solid waste regulations and guidance.

2.7.1 Alternative 1: No Action

Evaluation of the No Action alternative is required under CERCLA, serving as a common reference point against which other alternatives can be evaluated. In Alternative 1, no containment, removal, or treatment of the soil at Sites 22 and 36 would occur, and no new controls would be implemented to prevent human exposure. However, existing security provisions that limit public access will continue until the Army vacates the UMDA facility. Natural recovery of the contaminated soil is unlikely at Sites 22 and 36 due to the characteristics of the dominant contaminants. The contaminants are nonvolatile and therefore their volatilization from soil at ambient temperatures is unlikely. In addition, biodegradation of the metal contaminants is unlikely due to their resistance to degradation. The primary mechanism that may serve to reduce contaminant concentrations is their dispersion (and resulting dilution) by wind. This mechanism is applicable to surface soils only.

The primary route of migration of contaminants in soil at Sites 22 and 36 is through windblown dust. A course of No Action would do nothing to limit the potential for contaminant migration.

This alternative does not meet the Oregon requirement for cleanup to background, or the lowest levels that are protective and feasible, nor does it achieve protection of human health and the environment within the guidelines of the NCP.

Alternative 1 requires no time to implement and involves no capital or operations and maintenance (O&M) costs.

2.7.2 Alternative 2: Containment of Contaminated Soil by Soil Cover [Option A] or Clay Cap [Option B]

This alternative involves the imposition of institutional controls on Sites 22 and 36 to limit access to (and future use of) the sites. In addition to institutional controls, this alternative involves the containment of contaminated soil by the use of a soil cover with vegetation or a clay/soil cap with vegetation.

The primary purposes of containment of contaminated soil by the use of a soil cover or an engineered (i.e., clay/soil) cap are to minimize direct contact with contaminated soil and reduce the mobility of the contaminants by preventing their dispersion as windborne dust. A secondary benefit to a soil cover or cap would be to limit infiltration from precipitation.

The soil cover under consideration consists of an 18-inch layer of clean soil obtained from uncontaminated areas at UMDA. The clay/soil cap consists of a 24-inch layer of clay covered by 18 inches of soil and gravel.

Activities involved in placing either the soil cover or clay/soil cap include clearing, grubbing, and grading. Once the soil or clay has been placed, it is compacted to the maximum extent possible and vegetation is placed over the cover or cap.

This alternative would not involve the removal of contaminated soil or its treatment. Contaminants would remain at the sites; however, human exposure would be prevented.

Estimates of the cost of implementing these alternatives were developed based on an estimate of contaminated soil surface area to be covered of 42,000 square feet. The present worth of the alternative assumes completion of the action within 15 months. The estimated costs of implementing Alternative 2 are:

Capital Cost:	$57,000	(A)
	$90,000	(B)

O&M Cost:	\$ 8,000 (A & B)
Present Worth:	\$65,000 (A) \$98,000 (B)

The following major applicable or relevant and appropriate requirement (ARAR) is cited for Alternative 2:

- Alternative 2 may not comply with state requirements for cleanup. Contaminant concentration levels are not reduced in Alternative 2. The State of Oregon considers the use of caps or covers as measures to supplement cleanups. They may be used as substitutes for cleanup only if it is determined that no other cleanup methods are protective and feasible.

2.7.3 Alternative 3: On-Site Treatment of All Contaminated Soil by Solidification/Stabilization and On-Site [Option A] or Off-Site [Option B] Disposal

In this alternative, all excavated contaminated soil would be treated by solidification/stabilization. Treated materials would be placed in the on-site UMDA landfill (Option A) or would be transported to an off-site landfill (Option B). Primary actions involved in implementing this alternative include:

- Excavate contaminated soil
- Conduct treatability studies of the use of solidification/stabilization
- Treat contaminated soil by solidification/stabilization
- Confirm, by testing and analysis, that treatment residuals are nonhazardous
- Dispose of the treatment residuals in the on-site UMDA landfill or in an off-site landfill

Solidification/stabilization waste treatment processes involve the mixing of specialized additives or reagents with waste materials to reduce (physically or chemically) the solubility or mobility of contaminants in the matrix. A common solidification/stabilization process involves mixing the wastes with a mixture of a pozzolan such as fly ash and cement to produce a relatively high-strength waste/concrete matrix in which contaminants are trapped.

Solidification/stabilization is a commonly used and effective technology to treat soils and sludges contaminated with metals so that the contaminants no longer present any threat to human health or the environment. Treatability studies are performed to develop the proper mix of chemical additives and operating conditions to achieve the desired results.

Implementation of the process would require sufficient land area around the operation to maintain a buffer zone, access roads capable of supporting heavy equipment (in this case, 80,000-lb trailers), and direct and unencumbered accessibility to the waste feed material. As the contaminated soil is treated, it is discharged to a dump truck, roll-off boxes, or other transportable containers for transport to the disposal area.

Estimates of the cost of implementing this alternative were developed based on an estimate of contaminated soil volume of 1,700 cubic yards (cy). The present worth of the alternative assumes completion within 12 months. The estimated costs of implementing Alternative 3 are:

Capital Cost:	\$197,000 (A) \$367,000 (B)

O&M Cost: $210,000 (A)
$202,000 (B)

Present Worth: $407,000 (A)
$569,000 (B)

The following major ARARs are cited for this alternative:

- This alternative complies with the State of Oregon cleanup requirements. Although cleanup to background is not achieved, the feasibility of cleanup to background was evaluated and considered not cost-effective. This alternative provides for the required level of risk reduction to meet residential/unrestricted future use standards at Sites 22 and 36.

- This alternative complies with RCRA requirements regarding the identification and listing of hazardous waste (40 CFR 261.3); standards applicable to generators of hazardous waste (40 CFR 262); design and operating standards for treatment units (40 CFR 264); and land disposal restrictions (LDR) (40 CFR 268).

- This alternative complies with state of Oregon Air Pollution Control Regulations that require control of emission involved in the excavation and handling of contaminated soil.

2.7.4 Alternative 4: Off-Site Treatment and Disposal

This alternative involves the excavation and removal of all contaminated soil. As the soil is excavated, it will be analyzed to determine whether its contaminant concentrations are high enough to be considered hazardous according to the RCRA. These soils will be transported off site to a RCRA permitted treatment facility to be treated by solidification/ stabilization. Treated soils will then be disposed of in an off-site landfill. Contaminated soils that do not require treatment according to RCRA will be disposed of off site.

Primary actions involved in implementing this alternative include:

- Excavate contaminated soil
- Analyze excavated soil to determine its hazardous characteristics in accordance with RCRA
- Segregate hazardous and nonhazardous contaminated soil
- Prepare manifests for the transport of the hazardous contaminated soil
- Transport hazardous and nonhazardous soil to a RCRA-permitted facility for the treatment of hazardous soil
- Dispose of treated soil and nonhazardous soil in an off-site landfill.

In this alternative, existing data and additional confirmation sampling and analysis will be used to characterize the soils as hazardous or non hazardous, as defined by RCRA (with respect to the presence of toxic concentrations of metals) and allow for segregation of the RCRA hazardous and nonhazardous soil. To the maximum extent possible, segregation will occur during excavation with necessary confirmation analyses performed after excavation.

On-site requirements for the implementation of this alternative are minimal. Personnel will be required to excavate the soil; conduct sampling and analysis of the soil samples; and load the excavated soil for transport off site. If the soils are determined to be nonhazardous, they will be transported off site for disposal at a solid waste landfill facility. If the soils are hazardous, they will be transported off site for treatment at a RCRA-permitted treatment, storage, and disposal facility (TSDF). The latter action will require the preparation of manifests for the transport of hazardous material before the soils can be transported off site.

Estimates of the cost of implementing this alternative were developed based on an estimate of contaminated soil volume of 1,700 cy. Since the proportion of the soil classified as hazardous waste is unknown, these costs assume that all of the excavated soil is hazardous. The present worth of this alternative assumes completion of the action within 12 months. The estimated costs of implementing Alternative 5 are:

Capital Cost:	$370,000
O&M Cost:	$0
Present Worth:	$370,000

The following major ARARs are cited for this alternative:

- This alternative complies with the State of Oregon cleanup requirements. Although cleanup to background is not achieved, the feasibility of cleanup to background was evaluated and considered not cost-effective. This alternative provides for the required level of risk reduction to meet unrestricted/residential future use standards.

- This alternative complies with RCRA requirements for hazardous waste identification and analysis (40 CFR 261.3) and waste treatment of hazardous wastes by off-site facilities that meet RCRA Standards for Owners and Operators of Hazardous Waste TSDFs (40 CFR 264).

- This alternative complies with RCRA standards applicable to generators of hazardous wastes (40 CFR 262) and the disposal of hazardous wastes on the land, or LDR, as stated in 40 CFR 268. The applicability of LDR will be determined by analyses to determine the hazardous characteristics of the soil with respect to the presence of toxic concentrations of metals.

- This alternative complies with Oregon Air Pollution Control Regulations that require control of emissions involved in the excavation and handling of contaminated soil.

2.8 Summary of Comparative Analysis of Alternatives

This section summarizes the relative performance of each of these alternatives with respect to the nine CERCLA evaluation criteria.

2.8.1 Threshold Criteria

Overall protection of human health and the environment. Alternative 1, the No Action alternative, is not protective of human health and the environment. Alternative 2 will not result in the treatment or removal of any of the contaminated soil; however, this alternative will reduce the risks associated with potential contacts with the soil and spread of contamination by dust.

Alternatives 3A and 3B provide the best potential for effectively protecting human health and the environment due to soil contamination at Sites 22 and 36. The alternatives result in the removal of all contaminated soil followed by treatment of all soil to prevent further threats imposed by the contaminants. Following treatment, the treated soils will be placed in a landfill that will be properly maintained and monitored to ensure that overall protection is maintained. In Alternative 3A, all actions associated with the cleanup are conducted on site and therefore eliminate any risks associated with off-site transport of treated soils. Alternative 4 involves the treatment of only those soils that are defined as hazardous under RCRA; contaminants in the other soils would be left untreated. However, the disposal of treated hazardous soil and untreated nonhazardous soil in Alternative 4 would be to a properly maintained and monitored landfill. Alternative 4 involves the transport of contaminated soil off site, which presents potential risks to human health and the environment outside the boundaries of UMDA.

Compliance with ARARs. Alternative 1 does not comply with ARARs. Alternatives 3 and 4 comply with all ARARs.

State soil cleanup requirements are met by Alternatives 3 and 4 in that contaminants are reduced to the lowest concentrations that are protective and feasible.

Contaminant concentrations are not reduced in Alternative 2. The State of Oregon considers the use of caps or covers as measures to supplement cleanups. They may be used as substitutes for cleanup only if it is determined that no other cleanup methods are protective and feasible. As a result, Alternative 2 may not meet state requirements. Alternatives 3 and 4 will comply with applicable RCRA regulations and standards, including standards for generators of hazardous wastes, treatment standards for hazardous wastes, analysis and identification requirements for hazardous wastes, and requirements for transport and treatment of hazardous waste.

Alternatives 3 and 4 will comply with state and federal ARARs that regulate and control air emissions resulting from remedial actions, including soil excavation and treatment.

2.8.2 Primary Balancing Criteria

Long-term effectiveness. Alternative 1 does not provide for any long-term risk reduction and therefore does not demonstrate long-term effectiveness.

Under normal circumstances, soil covers such as those to be implemented in Alternative 2 may be long-term and permanent solutions to the spread of contamination. However, they are considered less long-term and permanent than alternatives that involve treatment of the contaminated soil.

Alternatives 3A and 3B will result in the treatment of all contaminated soil, which offers long-term effectiveness. This effectiveness is further enhanced by disposing of the treated soil in a properly maintained and monitored landfill.

Alternative 4 results in the treatment of only hazardous soils. Untreated soils could present future risks that are only moderately reduced by their disposal in a maintained and monitored landfill.

Reduction in toxicity, mobility, or volume of contaminants through treatment. Alternative 1 does not reduce the toxicity, mobility, or volume of contaminants. Alternative 2 does not involve the treatment of contaminated soils and therefore does not achieve reductions in toxicity or volume of contaminants through treatment. However, the mobility of contaminants is reduced in Alternative 2 by the addition of a clean soil cover or cap.

Alternatives 3 and 4 will result in varying degrees of reducing the toxicity, mobility, or volume of contaminants through treatment. These alternatives will result in the immobilization of contaminants (by trapping them in a concrete-like material); however, only Alternative 3 will result in the immobilization of the contaminants in all of the excavated soils.

Short-term effectiveness. Alternative 1 is effective in the near term, since public access to UMDA is currently restricted. Operations associated with Alternative 2 are not expected to increase the risks to the community since no contaminants will be released to the environment. Operations associated with Alternatives 3A, 3B, and 4 provide the potential for risks to human health and the environment as they involve the removal, handling, treatment, and transport of contaminated soil and treated soil. However, the option that involves only on-site treatment and disposal (Alternative 3A) presents fewer risks to the community and environment, since no actions are conducted off site. Risks to workers involved in the various activities of these alternatives, and the environment, will be minimized through the application of proper engineering controls (such as wetting the soil to minimize dust emissions) and the use of personal protective equipment. Alternatives 3A , 3B, and 4 could be implemented in one year.

Implementability. There are no technical or administrative difficulties in implementing Alternative 1 since no actions will be required. Activities involved in carrying out Alternatives 2 through 4 have been successfully used in other cleanups. Services, materials, and equipment are readily available for their performance. Administrative difficulties are expected to be fewest for Alternative 3A. Solidification/stabilization will require treatability studies to develop a chemical additive mixture that will meet treatment requirements. Administrative difficulties are more likely for Alternative 4, which involves the off-site transport of hazardous soils.

Cost. The estimated capital, O&M, and present worth costs for each remedial alternative are as follows:

Alternative	Capital Cost	O&M Cost	Present Worth Cost
1	0	0	0
2A	$57,000	$8,000	$65,000
2B	$90,000	$ 8,000	$ 98,000
3A	$197,000	$ 210,000	$ 407,000
3B	$ 367,000	$ 202,000	$ 569,000
4	$ 370,00	0	$ 370,000

2.8.3 Modifying Criteria

State acceptance. The State of Oregon concurs with the Army and EPA in the selection of Alternative 3A for the cleanup of contaminated soils at Sites 22 and 36 (see State of Oregon Concurrence Letter in Appendix B). In addition, the state is satisfied that the state's remedial action process was followed in evaluating remedial action alternatives for the Miscellaneous Sites Operable Unit. The remediation/treatment required will be considered complete after the contaminated soil above the remedial action level at Sites 22 and 36 has been removed and treated.

Public acceptance. Based on the absence of any negative comment from the public, it is assumed that the public supports the selection of Alternative 3A.

2.9 Selected Remedy

The selected remedy to clean up the soil contamination associated with Sites 22 and 36 of the UMDA Miscellaneous Sites Operable Unit is Alternative 3A, Solidification/Stabilization and On-Site Disposal. This alternative was selected because it is protective, feasible, cost-effective, and meets the preference of CERCLA for treatment of the excavated soil on site at a cost not significantly greater than the off-site option. The major components of the selected remedy include the following:

- Excavation and stockpile of approximately 1,700 cubic yards of soil contaminated above the RAC at Site 22 (the Defense Reutilization Marketing Office) and Site 36 (the Building 493 Paint Sludge Discharge Area)
- Treatment of contaminated soil in a solidification/stabilization system on site to reduce TCLP leachate concentrations to less than the RCRA limit
- Disposal of treated material from the solidification/stabilization system in the on-site active landfill
- Restoration of excavated areas with clean backfill and vegetation
- No further action at sites other than 22 and 36

These actions will result in the removal and treatment of soils containing lead at concentrations in excess of 500 ppm at Site 22, thereby achieving cleanup goals at that site. Soil containing concentrations of cadmium and chromium at Site 36 in excess of their cleanup levels will reduce the HI at that site to a value of 1 or less, thereby reducing human health risks at that site.

Ground water was not found to be affected by the past activities at the Miscellaneous Sites and requires no cleanup under this ROD. No remedial action is needed at the other sites within the Miscellaneous Sites Operable Unit since the site health risks are within acceptable levels under a future residential use scenario. In addition, since all the soil with contamination above the remedial action levels will be removed from Sites 22 and 36, there will not be any need for five-year reviews of the sites.

2.10 Statutory Determinations

The selected remedy satisfies the requirements under Section 121 of CERCLA to:

- Protect human health and the environment
- Comply with ARARs
- Be cost-effective
- Utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable
- Satisfy the preference for treatment as a principal element

2.10.1 Protection of Human Health and the Environment

The selected remedy, Alternative 3A, will reduce risks posed to future users of Sites 22 and 36 through excavation of contaminated soil and treatment via solidification/stabilization followed by on-site disposal of the treated materials and replacement of excavated soil with clean soil. This remedy will accomplish the following goals:

- Human health risks associated with exposure to soil that remains in place at Sites 22 and 36 after excavation will be reduced to acceptable levels consistent with residential use.

- The mobility of contaminants in excavated soil will be reduced by solidification/stabilization to meet TCLP standards. Potential exposures to the treated soil (and contaminant mobility) will be minimized through disposal in the on-site landfill.
- Environmental protection is achieved by removing the contaminated soil, restoring excavated areas with clean backfill and vegetation, and immobilizing the contaminants in the excavated soil.

No unacceptable short-term risks or cross-media impacts will be caused by implementation of Alternative 3A. During remediation, adequate protection will be provided to the community and the environment by controlling dust generated during materials handling operations. In addition, workers will be provided with personal protective equipment and air monitoring will be conducted during all phases of remediation.

2.10.2 Compliance with ARARs

The selected remedy complies with all ARARs, including chemical-specific, location-specific, and action-specific ARARs.

Chemical-specific ARARs. The selected remedy complies with the State of Oregon cleanup requirements. Although cleanup to background is not achieved, the feasibility of cleanup to background was evaluated and considered not cost-effective. This alternative provides for the required level of risk reduction to meet residential future use at Sites 22 and 36.

The selected remedy complies with requirements for meeting treatment standards prior to the disposal of the treated waste in or on land. Upon completion of the remediation activity, the treatment equipment will be decontaminated and removed, and all waste and waste residues will be removed from the sites.

Location-specific ARARs. The selected remedy complies with requirements of the Endangered Species Act (40 CFR 502) to ensure that no remedial actions will proceed that will negatively affect endangered or threatened species. The sites do not contain wetlands, floodplains, or historic sites, and remediating the sites meets the requirements of NEPA.

Action-specific ARARs. This alternative complies with State of Oregon Air Pollution Control Regulations that require control of emissions involved in the excavation and handling of contaminated soil.

The selected remedy complies with RCRA requirements regarding the identification and listing of hazardous waste (40 CFR 261.3); standards for generators of hazardous wastes (40 CFR 262); and LDR (40 CFR 268).

2.10.3 Cost-Effectiveness

The selected remedy provides overall effectiveness proportionate to its costs. As part of the evaluation of cost-effectiveness, the State of Oregon requirement to determine the feasibility of cleanup to background was considered. The feasibility of cleanup to background was evaluated by estimating costs to clean up Sites 22 and 36 to background levels. In this estimate it was determined that approximately 8,670 cy of soil would require treatment to clean up to background, as opposed to 1,700 cy of soil for treatment to the remedial action levels. The resulting costs of implementing Alternative 3A to clean up to background would total approximately $2,950,000, which is 520 percent more than required to achieve cleanup to meet remedial action criteria. Since the cleanup to meet cleanup levels is sufficient to meet requirements for possible future residential use, it is determined that the additional cost to clean up to background is not cost-effective.

Potential cost savings can be realized if the cleanup of Sites 22 and 36 is combined with the cleanup of similarly contaminated sites at other UMDA operable units.

2.10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The selected remedy is a permanent solution since it permanently removes contamination from the sites, and then treats the contamination to immobilize the waste. Following treatment, the treated soils from the selected remedy will be placed in the UMDA landfill that will be properly maintained and monitored to meet RCRA Subtitle D (solid waste landfill) closure requirements.

The selected remedy meets the statutory requirement to utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.

2.10.5 Preference for Treatment as a Principal Element

The statutory preference for treatment is satisfied by using solidification/stabilization as the primary means for addressing the contaminants in the soil.

2.11 Documentation of Significant Changes

The selected remedy was the preferred alternative presented in the Proposed Plan. No changes have been made.

3.0 Responsiveness Summary

The final component of the ROD is the Responsiveness Summary, which serves two purposes. First, it provides the agency decision makers with information about community preferences regarding the remedial alternatives and general concerns about the site. Second, it demonstrates to members of the public how their comments were taken into account as part of the decision-making process.

Historically, community interest in the UMDA installation has centered on the impacts of installation operations on the local economy. Interest in the environmental impacts of UMDA activities has typically been low. Only the proposed chemical demilitarization program, which is separate from CERCLA remediation programs, has drawn substantial comment and concern.

As part of the installation's community relations program, the UMDA assembled in 1988 a Technical Review Committee (TRC), composed of elected and appointed officials and other interested citizens from the surrounding communities. Quarterly meetings provide an opportunity for UMDA to brief the TRC on installation environmental restoration projects and to solicit input from the TRC. Approximately 20 TRC meetings have been held during the remedial investigation and feasibility study for the Miscellaneous Sites Operable Unit. In those meetings, the TRC was briefed on the scope and results of the remedial investigation and the methodology of and remedial alternatives considered in the feasibility study. The response received from the TRC was positive; the members showed particular interest in and support for the solidification/stabilization alternative.

In December 1993, the TRC was converted to a Restoration Advisory Board (RAB) with similar functions. Two RAB meetings have been held to date.

Notice of the public comment period, public meeting, and availability of the Proposed Plan was published in the *Hermiston Herald*, the *Tri-City Herald*, and the *East Oregonian* in February 1994.

The Feasibility Study Report and Proposed Plan for the Miscellaneous Sites Operable Unit were released to the public on February 15, 1994. The public comment period started on that date and ended on March 17, 1994. The Feasibility Study Report and Proposed Plan were made available to the public at the following locations: Building 32, UMDA; the Hermiston Public Library, Hermiston, Oregon; and the EPA office in Portland, Oregon.

A public meeting was held at Armand Larive Junior High School, Hermiston, Oregon, on March 2, 1994, to inform the public of the preferred alternative and to seek public comments. At this meeting, representatives from UMDA, USAEC, EPA, ODEQ, and Arthur D. Little presented the proposed remedy. Approximately 10 people from the public and media attended the meeting. There were no questions asked during the informal questions and answer period specific to the Miscellaneous Sites. Two written comments were received during the comment period and expressed concern about the incineration of explosives and weapons on site at UMDA. The two comments are listed below.

Comment One

Name: (b) (6) [redacted]

Organization: Concerned Neighbors & Friends

Comment: I am very concerned about the Army's plan to incinerate weapons at the Umatilla Army Depot, Incineration is not safe. What we burn is not filtered out 100 percent and more and more is being discovered every year about the health risks involved in incineration.

Comment Two

Name: (b) (6) [redacted]

Organization: C.E.Q.

Comment: We agree that it is necessary to clean up specific areas at the UMDA due to contamination problems. We can not support any project that uses incineration as a disposal method or cleanup method. Incineration changes one form of contamination into another by releasing emissions through the smokestack.

Why was there no public notice about membership on this commission? An announcement at the March 2, 1994, Public Meeting is not an acceptable method of notifying the public about commission membership applications.

The first of these comments addresses a separate Army action to demilitarize stock piles of munitions and does not pertain to any actions proposed for the Miscellaneous Sites Operable Unit. The second comment appears to relate specifically to the Explosives Washout Plant Operable Unit since the proposed remedy for the cleanup of that site involves the thermal oxidation of explosives contaminants in an afterburner. No aspect of the cleanup for the Miscellaneous Sites involves incineration. The comments are addressed in detail in the Responsiveness Summary of the Explosives Washout Plant Record of Decision.

No other comments, either verbal or written, were received by UMDA, EPA, or ODEQ during the public comment period.

Appendix A
Site Investigation and Assessment Documents

The following documents contain the results of the site investigation and assessments of cleanup actions for the Miscellaneous Sites. These documents were made available to the public at the information repositories located at Building 32 UMDA; the Hermiston Public Library, Hermiston, Oregon; and the EPA office in Portland, Oregon.

Arthur D. Little, Inc. 1993. *Feasibility Study/RCRA Corrective Measures Study for Umatilla Army Depot Activity (UMDA), Oregon, Final Feasibility Study for Miscellaneous Sites (OU5)*. Prepared for the U.S. Army Environmental Center. Contract DAAA15-91-D-0016, Delivery Order 2.

Dames & Moore. 1990. *Final Enhanced Preliminary Assessment for Umatilla Depot Activity. Volumes 1 and 2*. Prepared for the U.S. Army Toxic and Hazardous Materials Agency. Contract No. DAAA15-88-D-0008, Delivery Order 3.

Dames & Moore. 1992a. *Final Human Health Baseline Risk Assessment Umatilla Depot Activity, Hermiston, Oregon*. Prepared for the U.S. Army Toxic and Hazardous Materials Agency. Contract No. DAAA15-88-D-0008, Delivery Order 3.

Dames & Moore. 1992b. *Final Remedial Investigation Report for the Umatilla Depot Activity, Hermiston, Oregon. Volumes 1 through 6*. Prepared for the U.S. Army Toxic and Hazardous Materials Agency. Contract No. DAAA15-88-D-0008, Delivery Order 3.

Dames & Moore. 1993. *Final Ecological Assessment (EA) Report, Remedial Investigation/Feasibility Study (RI/FS) of the Umatilla Depot Activity, Hermiston,Oregon*. Prepared for the U.S. Army Toxic and Hazardous Materials Agency. Contract No. DAAA15-88-D-0008, Delivery Order 3.

Appendix B
State of Oregon Letter of Concurrence

Oregon

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

July 26, 1994

Mr. Chuck Clarke
Regional Administrator, Region 10
U. S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

Re: Umatilla Depot Activity
Miscellaneous Sites
Operable Unit
Record of Decision

Dear Mr. Clark:

The Oregon Department of Environmental Quality (DEQ) has reviewed the final Record of Decision, for the Miscellaneous Sites Operable Unit at the U.S. Army's Umatilla Depot Activity (UMDA). I am pleased to advise you that DEQ concurs with the remedy recommended by EPA and the Army. The major components of that remedy include:

- Excavation and temporary stockpiling of contaminated soil from Sites number 22 and 36 (approximately 1,700 cubic yards of soil);
- Treatment of contaminated soil by solidification/stabilization to produce a cement-like soil mixture;
- Disposal of the treated soil in the UMDA Active Landfill; and,
- Replacement of excavated soils with clean soil and revegetation of the area.

I find that this remedy is protective, and to the maximum extent practicable is cost effective, uses permanent solutions and alternative technologies, is effective and implementable. Accordingly, it satisfies the requirements of ORS 465.315, and OAR 340-122-040 and 090.

It is understood that the placement of treated wastes from this operable unit into the Depot's Active Landfill is subject to the requirements of the permit for the landfill, previously issued by this Department.

811 SW Sixth Avenue
Portland, OR 97204-1390
(503) 229-5696
TDD (503) 229-6993

If you have any questions concerning this matter, please contact Bill Dana of DEQ's Waste Management and Cleanup Division at (503) 229-6530.

Sincerely,

Fred Hansen
Director

BD:m
SITE\SM5938
cc: Lewis D. Walker, DOD
LTC. Moses Whitehurst, Jr., UMDA
Harry Craig, EPA-OOO
Jeff Rodin, EPA, Seattle
Bill Dana, DEQ/WMCD
Stephanie Hallock, DEQ/ERO